The Claimed Invention is:

1. A balanced amplifier having an integrated coupler and impedance matching scheme, the impedance having a resistive component and a reactive component, the balanced amplifier comprising:

first and second active gain devices, each of the first and second active gain devices having a noise source impedance;

a coupler having an input port, a first output port in electrical communication with the first active gain device, and a second output port in electrical communication with the second active gain device, the coupler having a first transmission line arrangement between the input port and the first output port, and a second transmission line arrangement between the input port and the second output port; and

wherein the physical structure of the first and second transmission line arrangements matches at least one impedance component of the noise source impedance of the first and second active gain devices, respectively, without an impedance matching network being positioned between the coupler and the first and second active gain devices.

2. The balanced amplifier of claim 1 wherein:

the first transmission line arrangement includes at least one transmission line forming a first signal path, the at least one transmission line having dimensions providing of the first signal path with a resistive component of the impedance that substantially matches the resistive component of the noise source impedance for the first active gain device; and

the second transmission line arrangement includes at least one transmission line forming a second signal path, the at least one transmission line having dimensions providing of the second signal path with a resistive component

of the impedance that substantially matches the resistive component of the noise source impedance for the second active gain device.

3. The balanced amplifier of claim 2 wherein the first transmission line arrangement path has an output end connected to the first output port and the second transmission line arrangement has an output end connected to the second output port, the balanced amplifier further comprising:

a first reactive component shunting the output end of the first transmission line arrangement to ground; and

a second reactive component shunting the output end of the second transmission line arrangement to ground.

4. The balanced amplifier of claim 3 wherein the reactive component is selected from the group consisting essentially of: an inductor and a capacitor.

5. The balanced amplifier of claim 1 wherein the first and second transmission line arrangements are mounted on a substrate, the physical structure of the substrate providing the first and second transmission line arrangements with an impedance that substantially matches the noise source impedance of the first and second active gain devices, respectively.

6. The balanced amplifier of claim 1 wherein the coupler is of the type selected from the group consisting essentially of: a Wilkinson coupler, a quadrature coupler, a parallel-coupled line coupler, and a Lange coupler.

7. The balanced amplifier of claim 1 wherein the first and second transmission line arrangements are formed with coaxial cables, each coaxial cable having a predetermined characteristics impedance.

8. The balanced amplifier of claim 1 wherein the first and second transmission line arrangements are formed with microstrips.

9. The balanced amplifier of claim 1 wherein the active gain devices are formed with one or more transistors.

10. The balanced amplifier of claim wherein the active gain devices are formed with monolithic microwave integrated circuits.

11. A method of amplifying an electrical signal, the method comprising:

inputting an electrical signal into a coupler;

conducting the signal along a first transmission line arrangement to a first output port, the first transmission line having an impedance;

conducting the signal along a second transmission line arrangement to a second output port, the second transmission line having an impedance;

passing the signal directly from the first output port to a first active gain device, the impedance of the first output port substantially matching the noise source impedance of the first active gain device; and

passing the signal directly from the second output port to a second active gain device, the impedance of the second output port substantially matching the noise source impedance of the second active gain device.

12. The method of claim 11 further comprising:

shunting the first transmission line to ground with a reactive component; and

shunting the second transmission line to ground with a reactive component.

13. The method of claim 12 wherein:

conducting the signal along the first transmission line includes transmitting the signal along a microstrip, the microstrip having dimensions to provide a

resistive component of the first output port impedance substantially matching the resistive component of the noise source impedance for the first active gain device; and

conducting the signal along the second transmission line includes transmitting the signal along a microstrip, the microstrip having dimensions to provide a resistive component of the second output port impedance substantially matching the resistive component of the noise source impedance for the second active gain device.

14. The method of claim 12 wherein:

conducting the signal along the first transmission line includes transmitting the signal along a coaxial cable having a conductor, the conductor having dimensions to provide a resistive component of the first output port impedance substantially matching the resistive component of the noise source impedance for the first active gain device; and

conducting the signal along the second transmission line includes transmitting the signal along a coaxial cable having a conductor, the conductor having dimensions to provide a resistive component of the second output port impedance substantially matching the resistive component of the the second active gain device

15. The method of claim 12 wherein:

passing the signal directly from the first output port to a first active gain device includes passing the signal to a transistor; and

passing the signal directly from the second output port to a second active gain device includes passing the signal to a transistor.

16. The method of claim 12 wherein:

passing the signal directly from the first output port to a first active gain device includes passing the signal to a monolithic microwave integrated circuit; and

passing the signal directly from the second output port to a second active gain device includes passing the signal to a monolithic microwave integrated circuit.